Temperature Control Equipment

RoHS

Thermo-chiller Lineup

A chiller is used to control the temperature of circulating fluid and supply it to the heat source.

Thermo-chiller/Standard Type
Series ***HRS***

1.1 kW to 5.9 kW | With heating function

Temperature stability ±0.18°F [±0.1°C]

Thermo-chiller/Standard Type
Series ***HRS100/150***

10 kW/15 kW | With heating function

Temperature stability ±1.8°F [±1.0°C]

Thermo-chiller/Inverter Type
Series ***HRSH090***

9.5 kW to 11 kW | With heating function

Temperature stability ±0.18°F [±0.1°C]

Thermo-chiller/Inverter Type
Series ***HRSH***

10 kW to 28 kW | With heating function

Temperature stability ±0.18°F [±0.1°C]

Thermo-chiller/Basic Type
Series ***HRSE***

1.0 kW to 2.2 kW

Temperature stability ±3.6°F [±2.0°C]

Thermo-chiller/High-performance Type
Series ***HRZ/HRZD/HRW***

1.0 kW to 30 kW | With heating function

Temperature stability
±0.18/0.54°F [±0.1/0.3°C]

Peltier-type Thermo-con Lineup

Thermoelectric Bath
Series ***HEB***

140 W to 320 W | With heating function

Temperature stability ±0.018°F [±0.01°C]

Chemical Thermo-con
Series ***HED***

300 W to 750 W | With heating function

Temperature stability ±0.18°F [±0.1°C]

Thermo-con *Series* ***HEC/HECR***

140 W to 1200 W | With heating function

Temperature stability ±0.018 to 0.054°F
[±0.01 to 0.03°C]

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Thermo-chiller Variations

Series	Features	Temperature range setting °F [°C]	Cooling capacity	Cooling method	Temperature stability	Pump capacity
Thermo-chiller Standard type ***Series HRS***  CE cMETus (Only 60 Hz)	• With this chiller, cooling water can be obtained anywhere it is necessary because of easy installation and easy operation. • For a wide range of applications such as laser machine tool, analytical equipment, LCD manufacturing equipment, mold temperature control, etc. • Compact: W 14.8 x H 24.2 x D 19.7 inch, [W 377 x H 615 x D 500 mm] 88 lb [40 kg] (HRS012/018/024) • Timer operation function, Low level in tank, Power failure auto-restart, Anti-freezing operation function, etc. • Self diagnosis function • No heater required, circulating fluid is heated using heat exhausted by refrigerating circuit. • Low-noise design: 70 dB(A) (HRS100/150) • Outdoor installation: IPX4 (HRS100/150)	41 to 104 [5 to 40] 32 [0] 140 [60]	1.3 kW 1.9 kW 2.4 kW 3.2 kW 5.1 kW 5.9 kW (60 Hz)	Air-cooled Water-cooled	±0.18°F [±0.1°C]	11 g/min [42 L/min]
Thermo-chiller Standard type ***Series HRS100/150***  CE (Only 400 VAC type)		41 to 95 [5 to 35] 32 [0] 140 [60]	9.5 kW 14.5 kW (60 Hz)	Air-cooled Water-cooled	±1.8°F [±1.0°C]	18 g/min [68 L/min]
Thermo-chiller Inverter type ***Series HRSH090***  CE ETL (Only 400 VAC type)	• Power consumption reduced by 53% Outstanding energy saving effect with the triple inverter! • Max. ambient temperature: W14.8 x H 42.5 x D970 inch [W 377 x H 1080 x D 970 mm] • Low-noise design: Max.66 dB • Max. ambient temperature: 113°F [45°C]	41 to 104 [5 to 40] 32 [0] 140 [60]	9.5 kW	Air-cooled Water-cooled	±0.18°F [±0.1°C]	16 g/min [60 L/min]
Thermo-chiller Inverter type ***Series HRSH***  CE (400 V as standard, 200 V as an option) cMETus (Only 200 V as an option)	• Outstanding energy saving effect with the triple inverter! • Outdoor installation: IPX4 • Max. ambient temperature: 113°F [45°C] • Space-saving, Lightweight 617 lbs [280 kg] (25 kW type)	41 to 95 [5 to 35] 32 [0] 140 [60]	10 kW 15 kW 20 kW 25 kW 28 kW	Air-cooled Water-cooled	±0.18°F [±0.1°C]	48 g/min [180 L/min]
Thermo-chiller Basic type ***Series HRSE***  CE (Only 230 VAC type)	• Simple function and performance. Thermo-chiller of the basic type. • Large energy saving by triple control! Power consumption 33% energy saving • Compact/Lightweight 32 kg (100 VAC) • Maintenance free: Magnet pump • Low-noise design: 55 dB (A)	50 to 86 [10 to 30] 32 [0] 140 [60]	1.2 kW 1.6 kW 2.2 kW (60 Hz)	Air-cooled	±3.6°F [±2.0°C]	6.6 g/min [25 L/min]
Thermo-chiller High-performance type ***Series HRZ***  CE SEMI	• Suitable for semiconductor processing equipment with a wide variety of features such as high temperature stability, wide temperature range, failure diagnosis, external communication, etc. • Can respond to change of process conditions flexibly, which is suitable for semiconductor equipment with a short innovation cycle. • Conforming to various safety standards • Inverter type is selectable. Energy saving is achieved through use of a DC inverter compressor.	–4 to 104 [–20 to 40] –22 [–30] 194 [90] –4 to 194 [–20 to 90] –22 [–30] 194 [90] –4 to 194 [–20 to 90] –22 [–30] 194 [90]	1 kW 2 kW 4 kW 8 kW	Water-cooled	±0.18°F [±0.1°C]	10.5 g/min [40 L/min]
Thermo-chiller High-performance type ***Series HRZ***  CE SEMI		–4 to 194 [–20 to 90] –22 [–30] 194 [90] 50 to 140 [10 to 60] –22 [–30] 194 [90]	10 kW	Water-cooled	±0.18°F [±0.1°C]	10.5 g/min [40 L/min]
Thermo-chiller High-performance inverter type ***Series HRZD***  CE SEMI	• Temperature for two systems can be controlled separately by one chiller. • Double inverter: More effective energy-saving is achieved through use of a DC inverter compressor and an inverter pump. • Space-saving: Footprint 23% reduction • Reduced wiring, piping and labor: Single power cable, single facility water piping system	–22 to 194 [–30 to 90] –22 [–30] 194 [90]	9.5 kW x 2	Water-cooled	±0.18°F [±0.1°C]	10.5 g/min [40 L/min]
Water-cooled thermo-chiller High-performance type ***Series HRW***  CE SEMI	• Direct heat exchanger for in-plant circulating fluid • Can control the temperature over a wide range since a compressor is not required. • Suitable for semiconductor processing equipment with a wide variety of features such as high temperature stability, wide temperature range, failure diagnosis, external communication, etc. • Inverter type is selectable.	68 to 194 [20 to 90] –22 [–30] 194 [90]	2 kW 8 kW 15 kW 30 kW	Water-cooled (Without compressor)	±0.54°F [±0.3°C]	13 g/min [50 L/min]
Water-cooled thermo-chiller High-performance inverter type ***Series HRW***  CE SEMI						

	Pump type	Power supply	Circulating fluid
	Magnet pump (Mechanical seal pump for high pressure pump mounted type)	Single-phase 100 VAC (50/60 Hz) Single-phase 115 VAC (60 Hz) Single-phase 200 to 230 VAC (50/60 Hz)	Tap water Deionized water Ethylene glycol aqueous solution (15%)
	Mechanical seal pump	3-phase 200 VAC (50 Hz) 3-phase 200 to 230 VAC (60 Hz) 3-phase 380 to 415 VAC (50/60 Hz)	Tap water Deionized water Ethylene glycol aqueous solution (15%)
	Mechanical seal pump	3-phase 200 VAC (50 Hz) 3-phase 200 to 230 VAC (60 Hz) 3-phase 380 to 415 VAC (50/60 Hz)	Tap water Deionized water Ethylene glycol aqueous solution (15%)
	Immersion pump	3-phase 200 VAC (50 Hz) 3-phase 200 to 230 VAC (60 Hz) 3-phase 380 to 415 VAC (50/60 Hz)	Tap water Deionized water Ethylene glycol aqueous solution (15%)
	Magnet pump	Single-phase 100 VAC (50/60 Hz) Single-phase 200 VAC (50/60 Hz) Single-phase 230	Tap water Ethylene glycol aqueous solution (15%)
	Immersion pump	3-phase 200 VAC (50 Hz) 3-phase 200 to 208 VAC (60 Hz)	Fluorinated fluid Tap water Deionized water Ethylene glycol aqueous solution (60%)
	Immersion pump	3-phase 200 VAC (50 Hz) 3-phase 200 to 208 VAC (60 Hz)	Fluorinated fluid Tap water Deionized water Ethylene glycol aqueous solution (60%)
	Immersion pump	3-phase 200 VAC (50 Hz) 3-phase 200 to 208 VAC (60 Hz)	Fluorinated fluid Ethylene glycol aqueous solution (60%)
	Immersion pump	3-phase 200 VAC (50 Hz) 3-phase 200 to 208 VAC (60 Hz)	Fluorinated fluid Tap water Deionized water Ethylene glycol aqueous solution (60%)

Accessories List

●: Standard ◆: Option ★: Optional accessories

	HRS	HRS100/150	HRSH090	HRSH	HRSE	HRZ	HRZD	HRW
Heating function	●	●	●	●		●	●	●
Fan inverter			●	●				
Compressor inverter			●	●		●	●	
Pump inverter			●	●		●	●	●
PID control	●	●	●	●		●	●	●
ON/OFF control					●			
Error diagnostic function	●	●	●	●	●	●	●	●
Flow sensor/switch					●	●	●	●
RS-232C	●	●	●	●				
RS-485	●	●	●	●		●	●	●
Analog I/O (Contact input/output)	●/★	●	●	●		●	●	●
Analog communication	★					◆	●	◆
DeviceNet Communication						◆		◆
With earth leakage breaker	◆	◆	◆	◆				
With earth leakage breaker with handle				◆		●	●	●
With heater						●	●	●
With external switch inlet	●	●	●	●				
With water leakage sensor						●	●	●
Drain pan set (With water leakage sensor)	★							
With automatic water fill function	◆	●		●				
With fluid fill port	●	◆	●	◆	●	●	●	●
Applicable to deionized water piping	◆		◆					●
High pressure pump mounted	◆				◆			
High temperature environment specification	◆							
With caster adjuster-foot		◆/★		◆/★		●	●	●
Circulating Fluid Automatic Recovery						◆		◆
DI control kit/Electrical resistance control set	★					◆		◆
Electrical resistance sensor set	★							
Electric conductivity control set		★	★	★				
DI filter set	★					★		★
Insulating material for DI filter						★		★
Anti-quake bracket	★		●	●	★	★		★
Piping conversion fitting (NPT thread or G thread)	◆/★	◆/★	◆/★	◆/★				
NPT fitting						◆		◆
Bypass piping set	★	★	★	★	★	★	★	★
Power supply cable	★							
Particle filter set	★	★	★	★	★			
Contaminant filter								★
Connector cover	★							
Replacement type dustproof filter set	★				★			
Separately installed power transformer	★							
Relief valve set		★						
Snow protection hood		★		★				
4-port manifold						★		★
60% ethylene glycol aqueous solution						★		★
Ethylene glycol aqueous solution concentration meter	★	★	★	★	★	★	★	★

Peltier-type Thermo-con Variations

Series	Features	Temperature range setting °F [°C]	Cooling capacity	Cooling method	Temperature stability	Power supply	Circulating fluid	Option
Thermo-con **Rack mount type** ***Series HECR*** 	● Mountable in a 19-inch rack. Saves space by mounting multiple equipment together in a rack. ● Learning control function ● Low vibration, Low noise	50 to 140 [10 to 60] –22 [–30] to 194 [90]	200 W	Peltier-type air-cooled	±0.018 to 0.054°C [±0.01 to 0.03°C]	Single-phase 100 to 240 VAC (50/60 Hz)	Tap water Ethylene glycol aqueous solution (20%)	With feet and No rack mounting brackets With flow switch
			1 kW			Single-phase 200 to 240 VAC (50/60 Hz)		
Thermo-con ***Series HEC*** 	● For applications requiring high-precision temperature control ● High-precision, refrigerant-free temperature control equipment employing Peltier elements ● Highly-reliable simple construction ● Easy installation in equipment with a compact, low-vibration body	50 to 140 [10 to 60] –22 [–30] to 194 [90]	230 W 600 W	Peltier-type air-cooled	±0.018 to 0.054°C [±0.01 to 0.03°C]	Single-phase 100 to 240 VAC (50/60 Hz)	Tap water Ethylene glycol aqueous solution (20%)	With flow switch NPT thread With level switch
			140 W 320 W	Peltier-type water-cooled				
			600 W 1200 W			Single-phase 200 to 220 VAC (50/60 Hz)	Fluorinated fluid Tap water	
Thermoelectric Bath ***HEB***  Made to Order 	● High-precision temperature control bath with a Peltier device ● Compact and low noise ● Minimal up-down temperature distribution with a unique agitation method	5 to 140 [–15 to 60] –22 [–30] to 194 [90]	140 W	Round type Peltier-type water-cooled	±0.018°F [±0.01°C]	Single-phase 100 to 240 VAC (50/60 Hz)	Fluorinated fluid Tap water	NPT thread
			280 W			Single-phase 200 to 220 VAC (50/60 Hz)		
			140 W 320 W	Square type Peltier-type water-cooled	±0.054°F [±0.03°C]	Single-phase 100 to 240 VAC (50/60 Hz)	Tap water Ethylene glycol aqueous solution (50%)	
			220 W	Square type Peltier-type air-cooled				
Chemical Thermo-con ***Series HED***  SEMI	● Heat exchanger for direct temperature control with a Peltier device ● Compatible with a wide range of chemical liquids by use of a fluororesin heat exchanger	50 to 140 [10 to 60] –22 [–30] to 194 [90]	300 W 500 W 750 W	Peltier-type water-cooled	±0.18°F [±0.1°C]	Single-phase 200 to 220 VAC (50/60 Hz)	Deionized water Fluorinated fluid Ammonia hydrogen peroxide solution, etc.	

SMC's Unique Chiller Control — A Challenge to Downsizing

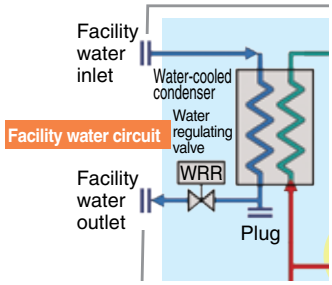
Temperature stability
±0.18°F[±0.1°C]/Compact

The precision temperature control method by expansion valve and temperature sensor, realized high temperature stability of ±0.18°F [±0.1°C] and a small-size tank.

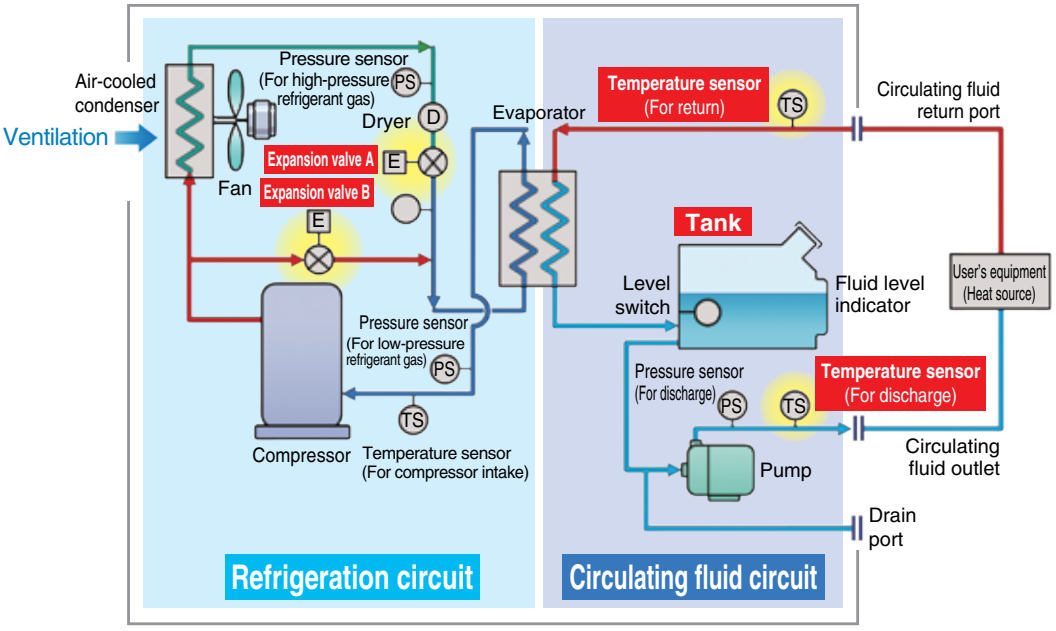
Applicable model

Standard type/ HRS012 to 060 | Inverter type/ HRSH090 | Inverter type/ HRSH100 to 300

■ Water-cooled



■ Air-cooled



∗ The flow diagram shown above is for standard type HRS012 to 060.

Refrigeration circuit

- The compressor compresses the refrigerant gas, and discharges the high temperature and high pressure refrigerant gas.
- In the case of air-cooled refrigeration, the high temperature and high pressure refrigerant gas is cooled down by an air-cooled condenser with the ventilation of the fan, and becomes a liquid. In the case of water-cooled refrigeration, the refrigerant gas is cooled by a water-cooled condenser with the facility water in the facility water circuit, and becomes a liquid.
- The liquefied high pressure refrigerant gas expands and its temperature lowers when it passes through expansion valve A and vaporizes by taking heat from the circulating fluid in the evaporator.
- The vaporized refrigerant gas is sucked into the compressor and compressed again.
- When heating the circulating fluid, the high pressure and high temperature refrigerant gas is bypassed into the evaporator by expansion valve B, to heat the circulating fluid.

Point The combination of precise control of **expansion valve A** for cooling, and **expansion valve B** for heating realized high temperature stability.

Circulating fluid circuit

- The circulating fluid discharged from the pump, is heated or cooled by the user's equipment and returns to the thermo-chiller.
- The circulating fluid is controlled to a set temperature by the refrigeration circuit, to be discharged to the user's equipment side again by the thermo-chiller.

Point Since the refrigeration circuit is controlled by the signal from **2 temperature sensors (for return and discharge)**, precise temperature control of the circulating fluid can be performed. Therefore, there is no necessity of absorbing the temperature difference in the circulating fluid with a large tank capacity, and realizes high temperature stability even with a **small-size tank**. Also, contributes to space-saving.

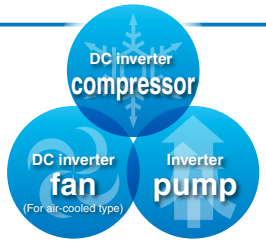
Facility water circuit

For water-cooled refrigeration HRS□-W-□

- The water regulating valve opens and closes to keep the refrigerant gas pressure consistent. The facility water flow rate is controlled by the water regulating valve.

Triple inverter

The inverter respectively controls the number of motor rotations of the compressor, fan and pump depending on the load from the user's equipment.



Applicable model

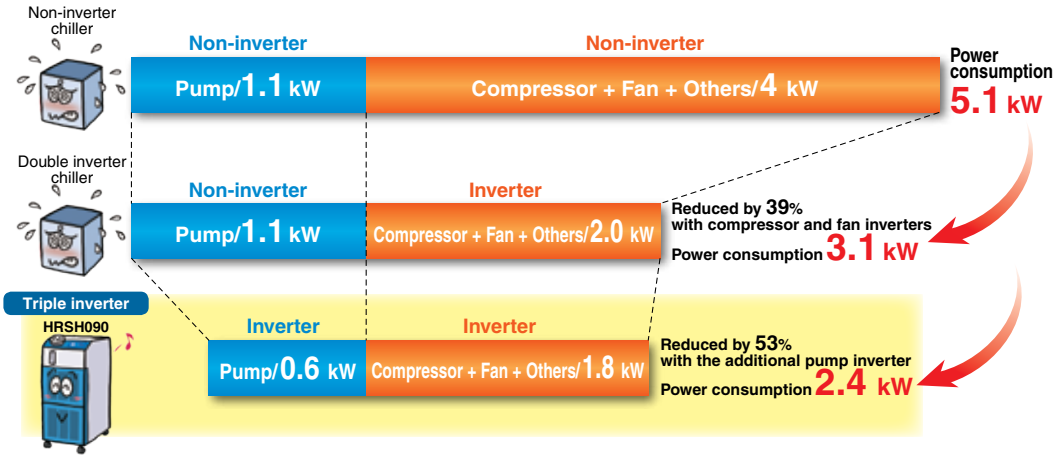
Inverter type/ HRSH090

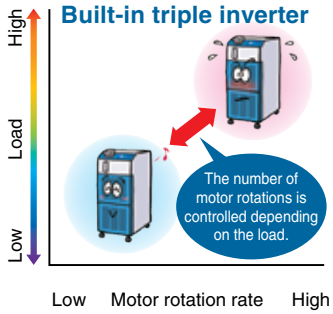
Inverter type/ HRSH100 to 300

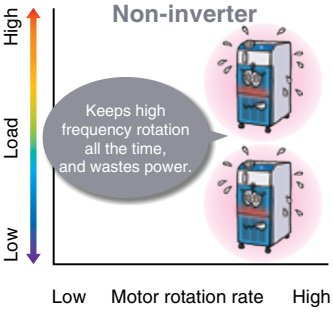
Power consumption reduced by 53%

compared with a non-inverter (HRSH090)

With the inverter, it is possible to operate with the same performance even with the power supply of 50 Hz.







Operating ratio: Ratio of 9.5 kW (with heat load) to 0 kW (without heat load) Operating ratio: 50%, with heat load of 9.5 kW all the time

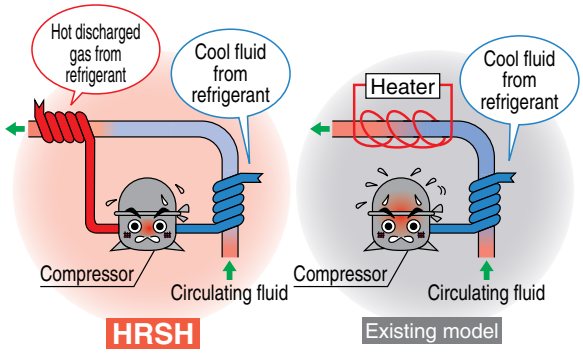
Conditions

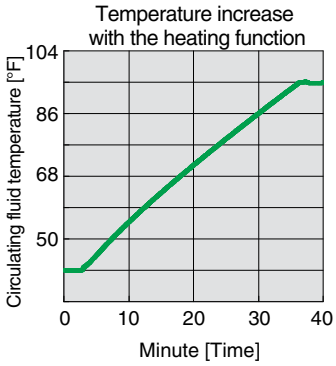
Common conditions for non-inverter and triple inverter:
- Ambient temperature: 90°F [32°C]
- Circulating fluid temperature: 68°F [20°C]
- Circulating fluid flow rate: 9.2 g/min [35 L/min]@44 psi [0.3 MPa] (60 Hz)
- Heat load: 9.5 kW

Conditions for non-inverter chiller: Continuous operation of the compressor which can cool down 9.5 kW at 60 Hz. The pump shall be same as that of the HRSH.

Circulating fluid can be heated without a heater.

Heating method using discharged heat makes a heater unnecessary.





∗This is just an example diagram.

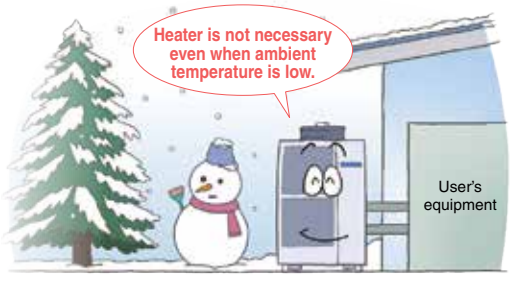
Applicable model

Standard type/ HRS012 to 060

Standard type/ HRS100/150

Inverter type/ HRSH090

Inverter type/ HRSH100 to 300



∗ For HRSH250-A-20

Conditions
- Ambient temperature: 41°F [5°C]
- Power supply: 200 V 60 Hz
- Circulating fluid flow: 33 g/min [125 L/min]@ 73 psi [0.5 MPa]
- External piping: Bypass piping

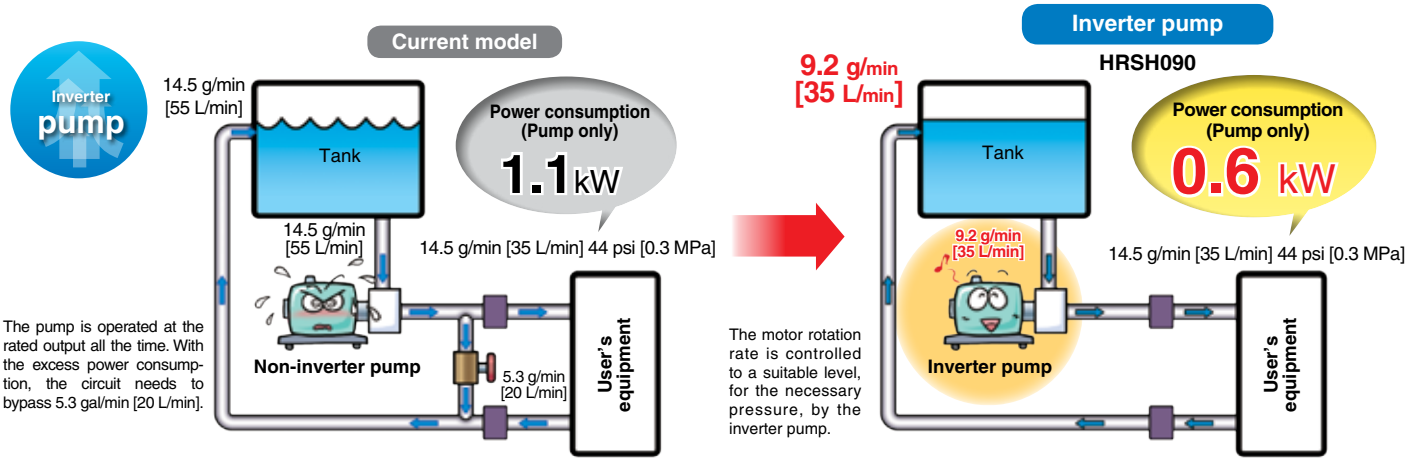
SMC

Inverter pump

Power reducing effect of the inverter pump

Applicable model

Inverter type/ HRSH090 | Inverter type/ HRSH100 to 300

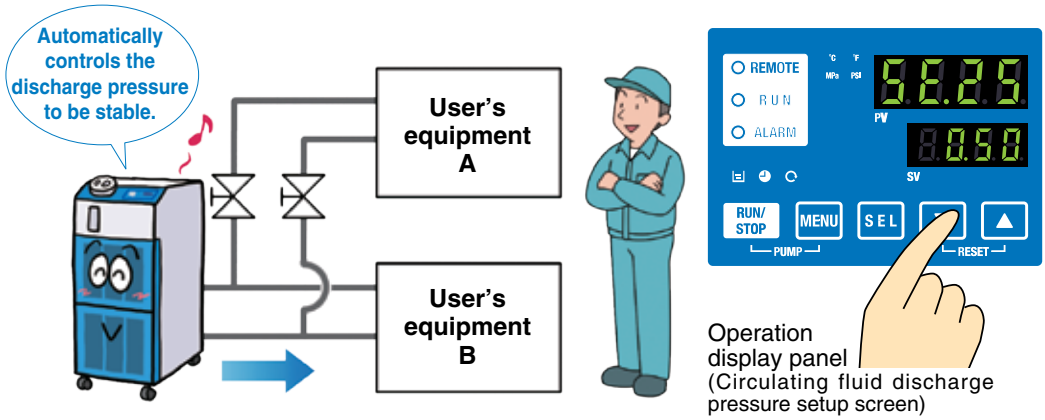


∗ Immersion pump is used for the inverter type HRSH100 to 300.

Circulating fluid pressure adjustable

Discharge pressure of the circulating fluid can be set with the operation panel. The inverter pump automatically controls the discharge pressure to the set pressure without adjusting the bypass piping under various piping conditions. Power consumption can be reduced by this control. (Operation to the set pump operating frequency is also possible.)

∗ Bypass piping is required depending on the flow rate.

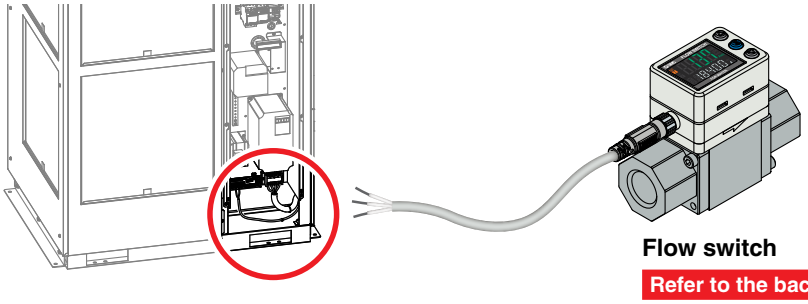


Operation display panel (Circulating fluid discharge pressure setup screen)

When the product is used with the flow path switched for maintenance, the pressure adjusting function controls the discharge pressure to be stable. (Secure the specified minimum flow for each branch circuit.)

Power supply (24 VDC) available

Power can be supplied from the terminal block on the rear side to external switches etc.



Flow switch

Refer to the back cover

Applicable model

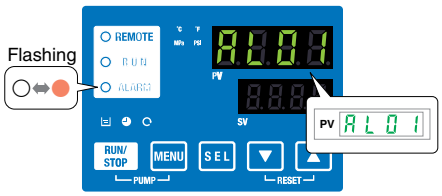
Standard type/ HRS012 to 060 | Standard type/ HRS100/150

Inverter type/ HRSH090 | Inverter type/ HRSH100 to 300

Easy maintenance with the check display of the operation panel

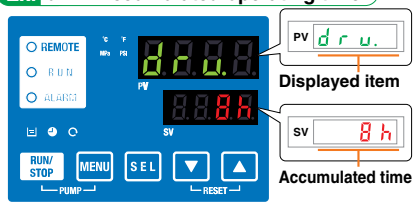
Alarm codes notify of checking times.
Notifies when to check the **pump** and **fan motor.**
Helpful for facility maintenance.

Ex. AL01 "Low level in tank"



Check display
The internal temperature, pressure and operating time of the product are displayed.

Ex. drv. "Accumulated operating time"



Displayed item			
Temperature	Circulating fluid outlet temperature	Operating time	Accumulated operating time
	Circulating fluid return temperature		Accumulated operating time of pump
	Compressor gas temperature		Accumulated operating time of fan*2
Flow rate	Circulating fluid flow rate*1		Accumulated operating time of compressor
Pressure	Circulating fluid outlet pressure		Accumulated operation time of dustproof filter*2
	Compressor gas discharge pressure		
	Compressor gas return pressure		

Applicable model

Standard type/ HRS012 to 060 | Standard type/ HRS100/150

Inverter type/ HRSH090 | Inverter type/ HRSH100 to 300

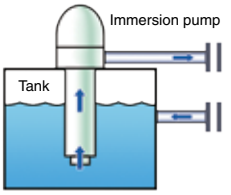
*1 This is not measurement value. Use it for reference. (Except standard type HRS012 to 060)
*2 These are displayed only for air-cooled refrigeration.

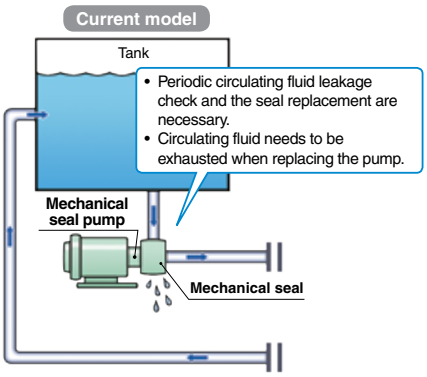
Reduces the maintenance hours for the pump.

Mechanical seal-less immersion pump is used.

As the pump has no external leakage of the circulating fluid, a periodic check of the pump leakage and replacement of the mechanical seal are not necessary. There is no need to exhaust the circulating fluid when removing the pump.

HRSH





Applicable model

Inverter type/ HRSH100 to 300

IPX4

Applicable model

Standard type/ HRS100/150 | Inverter type/ HRSH100 to 300

IP (International Protection) is the industrial standard for "Degrees of protection provided by outer defensive enclosures of electric equipment (IP Code)" according to IEC 60529 and JIS C 0920.

IPX4: No harmful influence by water splash is acceptable from every direction.

Can be installed outdoors.

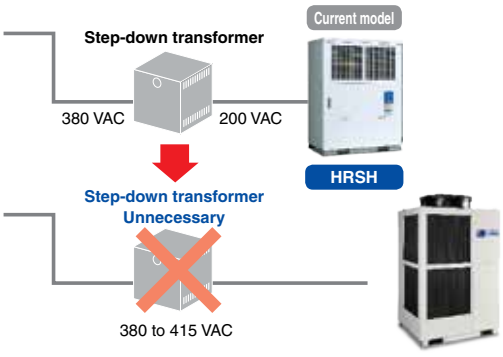
Global compatibility

(Europe, Asia, Oceania, Central and South America)

Transformer unnecessary

Power supply **Applicable to 200 to 230 VAC, or 380 to 415 VAC**

Transformers are unnecessary even when used overseas.



Applicable model

Standard type/ HRS012 to 060 | Standard type/ HRS100/150

Inverter type/ HRSH090 | Inverter type/ HRSH100 to 300

Basic type/ HRSE

Conforming to International Standards

CE cULus MET ETL SEMI

P.1, 3 Refer to the variations table.

SMC

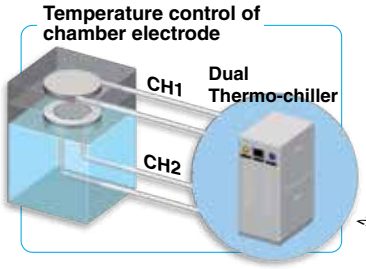
Thermo-chiller/High-performance Type *Series HRZ/HRZD/HRW*

HRZ *HRW*

- Temperature stability ±0.18°F [±0.1°C], temperature range from –4 to 194°F [–20°C to 90°C]. Full array of features and equipment.
- A double inverter type is also available, saving energy more effectively through use of a DC inverter compressor and an inverter pump.

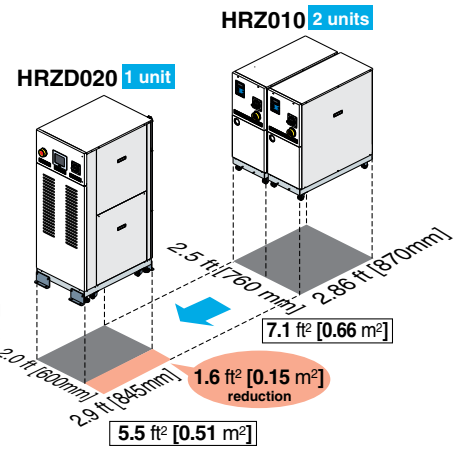
HRZD

- Dual Thermo-chiller, HRZD series can control temperature for two systems separately by one chiller. Energy-saving thanks to reduced wiring, piping and labor, and double inverter type.



Space-saving

Footprint reduced by 23%



Peltier-type Thermo-con Lineup

Thermo-con *Series HECR/HEC*

Temperature stability: ±0.018 to 0.054°F [±0.01 to 0.03°C]

Rack mount type *Series HECR*

Series HEC

Thermoelectric Bath *Series HEB*

Accurately controls the temperature of liquid in the bath.
Temperature stability: ±0.018°F [±0.01°C]

This equipment precisely controls the temperature of the fluid in the constant temperature tank.
Customers can control the temperature by placing a container in the tank.

INR
Made to Order

Chemical Thermo-con *Series HED*

Fluororesin heat exchanger allows direct temperature control for chemical liquids!!

Global Supply Network

SMC has a comprehensive network in the global market.

We now have a presence of more than 400 branch offices and distributors in 78 countries world wide such as Asia, Oceania, North/Central/South America, and Europe. With this global network, we are able to provide a global supply of our substantial range of products with the best service. We also provide full support to local factories, foreign manufacturing companies and Japanese companies in each country.

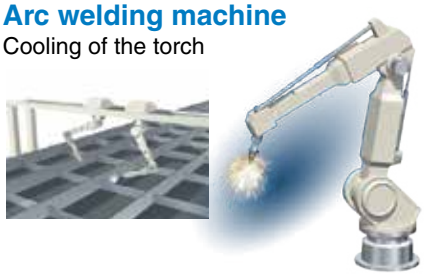
Applications

Laser beam machine/ Laser welding machine
Cooling of the laser oscillation part and power source

Printing machine
Temperature control of the roller

Cleaning machine
Temperature control of cleaning solution

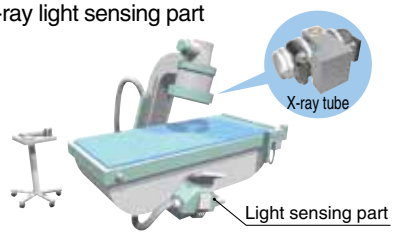
Arc welding machine
Cooling of the torch



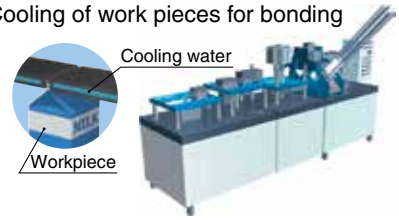
Resistance welding machine (spot welding)
Cooling of the welding head electrodes, transformers and transistors (thyristors)

High frequency induction heating equipment
Cooling of the heating coils, high frequency power source and around inverters

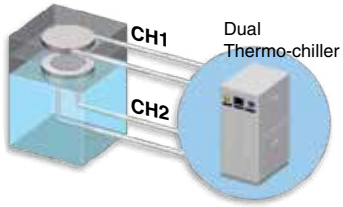
X-ray (digital) instrument
Temperature control of X-ray tube and X-ray light sensing part



Packaging line (sealing of film and paper package)
Cooling of work pieces for bonding



Temperature control of chamber electrode



MRI

Injection molding

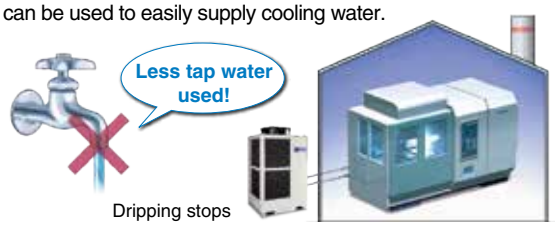
Atomizing device (food and cosmetics)
Temperature control of sample and device

Crushing machine
Cooling of the jacket

Makes cooling water easily available, anytime, anywhere.

When... There is no cooling tower. Tap water is being used.

Even without a cooling tower, an air-cooled refrigerated chiller can be used to easily supply cooling water.



When... There is a cooling tower, but high temperatures in summer or low (freezing) temperatures in winter make cooling water temperatures unstable.

Cooling water at a consistent temperature can be supplied regardless of the season.

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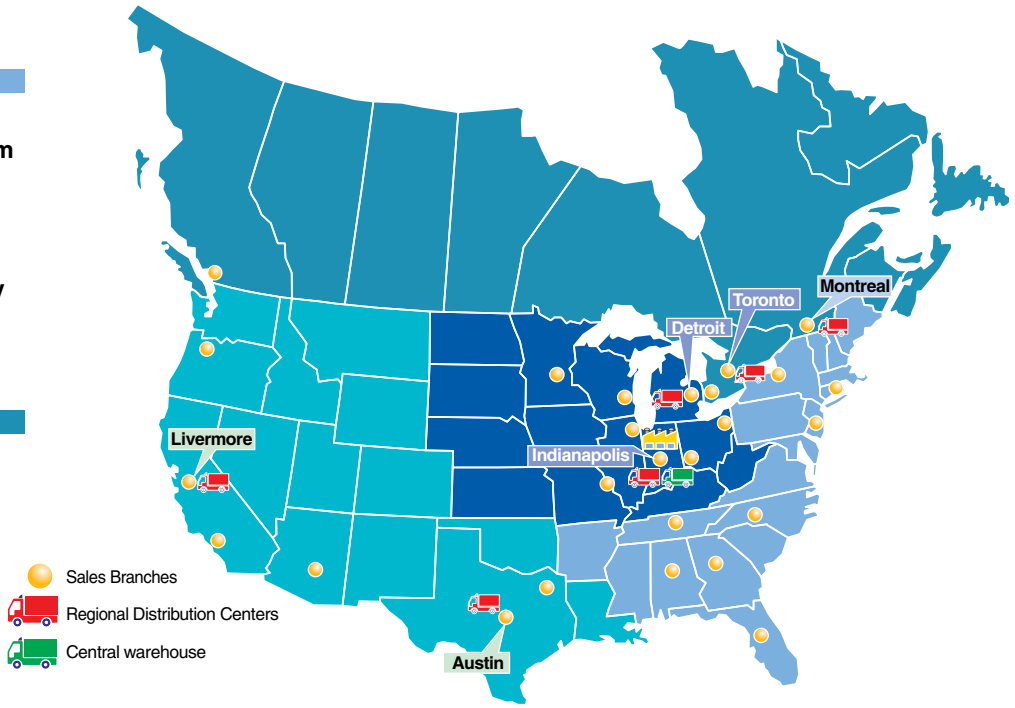

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